JOURNAL OF CHANGDE TEACHERS UNIVERSITY-NATURAL SCIENCE EDITION
ISSN: 1009-3818
October 2017

# Computer Learning Environment: Application, Implication and Challenge

**Review Paper**
Received Mar. 15, 2017
Revised Jul. 15, 2017
Accepted Sep. 10, 2017

**Tamar Kipiani**
Tbilisi State University, Department of Psychology

**Abstract** This study is presented in conjunction with the instruction for the integration of self-learning and reflection, knowledge using a computer learning environment to increase understanding of displacement. Provides both types of training, animation experiments and students for prediction View results, view results and explain your ideas. In addition, reflective teaching detected certain disruptions in students' reasoning and encouraged students to reflect. In these dilemmas as well as the establishment of general principles. We mentioned the effect Teaching about students who believe that scientific phenomena are governed by principles (Cohesive beliefs) against students who believed that science was a set of communications " Facts " (dispersed beliefs). Students typically use several models of displacement Various explanations depending on the evaluation. After reviewing, we discovered that students with human beliefs not only retain their understanding of displacement volume, however, when exposed to the integration instruction reflects, in fact. It continued to build more predictive perspectives on the guidelines. In contrast, students with instead of long-term development, beliefs are independent of the form of education.
**Keywords:** computer learning environment, integration of self-learning, reflection knowledge

## Introduction

Education like any other design science such as Medicine, engineering, computer science and architecture it needs a set of research methods and methodology. Reported to guide the design process. Here are some computer designs our learning environment. We hope that these findings will be found helping other designers create learning environments which advances the integrity of scientific knowledge, we propose A Synthetic Research Framework for Learning showed successful training is also promising encourages new models and their use in several ways (Johnson Leard, 1983; Larkin et al.1980).

Interactive computing technology was primarily conceived by academics, but the use of technology in education has historically been defined by contemporary research trends. The earliest instances of software in instruction drilled students using the behaviorist method that was popular throughout the mid-twentieth century. In the 1970s as cognitivism gained traction with educators, designers began to envision learning technology that employed artificial intelligence models that could adapt to individual learners. Computer-supported collaborative learning emerged as a strategy rich with research implications for the growing philosophies of constructivism and social cognitivism.

Though studies in collaborative learning and technology took place throughout the 1980s and 90s, the earliest public workshop directly addressing CSCL was "Joint Problem Solving and Microcomputers" which took place in San Diego in 1983. Six years later in 1989, the term "computer-supported collaborative learning" was used in a NATO-sponsored workshop in Maratea, Italy.[1][5] A biannual CSCL conference series began in 1995. At the 2002 and 2003 CSCL conferences, the International Society of the Learning Sciences (ISLS) was established to run the CSCL and ICLS conference series and the International

Journal of Computer-Supported Collaborative Learning (ijCSCL) and JLS journals.

The ijCSCL was established by the CSCL research community and ISLS. It began quarterly publication by Springer in 2006. It is peer reviewed and published both online and in print. Since 2009, it has been rated by ISI as being in the top 10% of educational research journals based on its impact factor.

The rapid development of social media technologies and the increasing need of individuals to understand and use those technologies has brought researchers from many disciplines to the field of CSCL.

The field of CSCL draws heavily from a number of learning theories that emphasize that knowledge is the result of learners interacting with each other, sharing knowledge, and building knowledge as a group. Since the field focuses on collaborative activity and collaborative learning, it inherently takes much from constructivist and social cognitivist learning theories.

**Theories**

The roots of collaborative epistemology as related to CSCL can be found in Vygotsky's social learning theory. Of particular importance to CSCL is the theory's notion of internalization, or the idea that knowledge is developed by one's interaction with one's surrounding culture and society. The second key element is what Vygotsky called the Zone of proximal development. This refers to a range of tasks that can be too difficult for a learner to master by themselves but is made possible with the assistance of a more skilled individual or teacher. These ideas feed into a notion central to CSCL: knowledge building is achieved through interaction with others.

Cooperative learning, though different in some ways from collaborative learning, also contributes to the success of teams in CSCL environments. The distinction can be stated as: cooperative learning focuses on the effects of group interaction on individual learning whereas collaborative learning is more concerned with the cognitive processes at the group unit of analysis such as shared meaning making and the joint problem space. The five elements for effective cooperative groups identified by the work of Johnson and Johnson are positive interdependence, individual accountability, promotive interaction, social skills, and group processing. Because of the inherent relationship between cooperation and collaboration, understanding what encourages successful cooperation is essential to CSCL research.

In the late 1980s and early 1990s, Marlene Scardamalia and Carl Bereiter wrote seminal articles leading to the development of key CSCL concepts: knowledge-building communities and knowledge-building discourse, intentional learning, and expert processes. Their work led to an early collaboration-enabling technology known as the Computer Supported Intentional Learning Environment (CSILE). Characteristically for CSCL, their theories were integrated with the design, deployment, and study of the CSCL technology. CSILE later became Knowledge Forum, which is the most widely used CSCL technology worldwide to date.

Other learning theories that provide a foundation for CSCL include distributed cognition, problem-based learning, group cognition, cognitive apprenticeship, and situated learning. Each of these learning theories focuses on the social aspect of learning and knowledge building, and recognizes that learning and knowledge building involve inter-personal activities including conversation, argument, and negotiation.

**Collaboration Theory**

Only in the last 15 to 20 years have researchers begun to explore the extent to which computer technology could enhance the collaborative learning process. While researchers, in general, have relied on learning theories developed without consideration of computer-support, some have suggested that the field needs to have a theory tailored and refined for the unique challenges that confront those trying to understand the complex interplay of technology and collaborative learning.

Collaboration theory, suggested as a system of analysis for CSCL by Gerry Stahl in 2002-2006, postulates that knowledge is constructed in social interactions such as discourse. The theory suggests that learning is not a matter of accepting fixed facts, but is the dynamic, on-going, and evolving result of complex interactions primarily taking place within communities of people. It also emphasizes that collaborative learning is a process of constructing meaning and that meaning creation most often takes place and can be observed at the group unit of analysis. The goal of collaboration theory is to develop an understanding of how meaning is collaboratively constructed, preserved, and re-learned through the media of language and artifacts in group interaction. There are four crucial themes in collaboration theory: collaborative knowledge building (which is seen as a more concrete term than "learning"); group and personal perspectives intertwining to create group understanding; mediation by artifacts (or the use of resources which learners can share or imprint meaning on); and interaction analysis using captured examples that can be analyzed as proof that the knowledge building occurred.

Collaboration theory proposes that technology in support of CSCL should provide new types of media that foster the building of collaborative knowing; facilitate the comparison of knowledge built by different types and sizes of groups; and help collaborative groups with the act of negotiating the knowledge they are building. Further, these technologies and designs should strive to remove the teacher as the bottleneck in the communication process. In other words, the teacher should not have to act as the conduit for communication between students or as the avenue by which information is dispensed. Finally, collaboration theory-influenced technologies will strive to increase the quantity and quality of learning moments via computer-simulated situations.

Stahl extended his proposals about collaboration theory during the next decade with his research on group cognition. In his book on "Group Cognition", he provided a number of case studies of prototypes of collaboration technology, as well as a sample in-depth interaction analysis and several essays on theoretical issues related to re-conceptualizing cognition at the small-group unit of analysis. He then launched the Virtual Math Teams project at the Math Forum, which conducted more than 10 years of studies of students exploring mathematical topics collaboratively online. "Studying VMT" documented many issues of design, analysis and theory related to this project. The VMT later focused on supporting dynamic geometry by integrating a multi-user version of GeoGebra. All aspects of this phase of the VMT project were described in "Translating Euclid." Finally, "Constructing Dynamic Triangles Together" provided a detailed analysis of how a group of four girls learned about dynamic geometry by enacting a series of group practices during an eight-session longitudinal case study. The VMT project generated and analyzed data at the small-group unit of analysis, to substantiate and refine the theory of group cognition and to offer a model of design-based CSCL research.

**Strategies**

Currently, CSCL is used in instructional plans in classrooms both traditional and online from primary school to post-graduate institutions. Like any other instructional activity, it has its own prescribed practices and strategies which educators are encouraged to employ in order to use it effectively. Because its use is so widespread, there are innumerable scenarios in the use of CSCL, but there are several common strategies that provide a foundation for group cognition.

One of the most common approaches to CSCL is collaborative writing. Though the final product can be anything from a research paper, a Wikipedia entry, or a short story, the process of planning and writing together encourages students to express their ideas and develop a group understanding of the subject matter. Tools like blogs, interactive whiteboards, and custom spaces that combine free writing with communication tools can be used to share work, form ideas, and write synchronously.

Technology-mediated discourse refers to debates, discussions, and other social learning techniques involving the examination of a theme using technology. For example, wikis are a way to encourage discussion among learners, but other common tools include mind maps, survey systems, and simple message boards. Like collaborative writing, technology-mediated discourse allows participants that may be separated by time and distance to engage in conversations and build knowledge together.

Group exploration refers to the shared discovery of a place, activity, environment or topic among two or more people. Students do their exploring in an online environment, use technology to better understand a physical area, or reflect on their experiences together through the Internet. Virtual worlds like Second Life and Whyville as well as synchronous communication tools like Skype may be used for this kind of learning.

Problem-based learning is a popular instructional activity that lends itself well to CSCL because of the social implications of problem solving. Complex problems call for rich group interplay that encourages collaboration and creates movement toward a clear goal.

Project-based learning is similar to problem-based learning in that it creates impetus to establish team roles and set goals. The need for collaboration is also essential for any project and encourages team members to build experience and knowledge together. Although there are many advantages to using software that has been specifically developed to support collaborative learning or project-based learning in a particular domain, any file sharing or communication tools can be used to facilitate CSCL in problem- or project-based environments.

When Web 2.0 applications (wikies, blogs, RSS feed, collaborative writing, video sharing, social networks, etc.) are used for computer-supported collaborative learning specific strategies should be used for their implementation, especially regarding (1) adoption by teachers and students; (2) usability and quality in use issues; (3) technology maintenance; (4) pedagogy and instructional design; (5) social interaction between students; (6) privacy issues; and (7) information/system security.

**Teacher Roles**

Though the focus in CSCL is on individuals collaborating with their peers, teachers still have a vital role in facilitating learning. Most obviously, the instructor must introduce the CSCL activity in a thoughtful way that contributes to an overarching design plan for the course. The design should clearly define the learning outcomes and assessments for the activity. In order to assure that learners are aware of these objectives and that they are eventually met, proper administration of both resources and expectations is necessary to avoid learner overload. Once the activity has begun, the teacher is charged with kick-starting and monitoring discussion to facilitate learning. He or she must also be able to mitigate technical issues for the class. Lastly, the instructor must engage in assessment, in whatever form the design calls for, in order to ensure objectives have been met for all students.

Without the proper structure, any CSCL strategy can lose its effectiveness. It is the responsibility of the teacher to make students aware of what their goals are, how they should be interacting, potential technological concerns, and the time-frame for the exercise. This framework should enhance the experience for learners by supporting collaboration and creating opportunities for the construction of knowledge. Another important consideration of educators who implement online learning environments is affordance. Students who are already comfortable with online communication often choose to interact casually. Mediators should pay special attention to make students aware of their expectations for formality online. While students sometime have frames of reference for online communication, they often do not have all of the skills necessary to solve problems by themselves. Ideally, teachers provide what is called "scaffolding", a platform of knowledge that they can build on. A unique benefit of CSCL is that, given proper teacher facilitation, students can use technology to build learning foundations with their peers. This allows instructors to gauge the difficulty of the tasks presented and make informed decisions about the extent of the scaffolding needed.

According to Salomon (1995), the possibility of intellectual partnerships with both peers and advanced information technology has changed the criteria for what is counted to be the effects of technology. Instead of only concentrating on the amount and quality of learning outcomes, we need to distinguish between two kinds of effects: that is, "effects with a tool and/or collaborating peers, and effects of these." He used the term called "effects with" which is to describe the changes that take place while one is engaged in intellectual partnership with peers or with a computer tool. For example, the changed quality of problem solving in a team. And he means the word "effects of" more lasting changes that take place when computer-enhanced collaboration teaches students to ask more exact and explicit questions even when not using that system.

**Applications**

It has a number of implications for instructional designers, developers, and teachers.

- First, it revealed what technological features or functions were particularly important and useful to students in the context of writing, and how a CSCL system could be adapted for use for different subject areas, which have specific implications for instructional designers or developers to consider when designing CSCL tools.
- Second, this study also suggested the important role of a teacher in designing the scaffolds, scaffolding the collaborative learning process, and making CSCL a success. Third, it is important that a meaningful, real-world task is designed for CSCL in order to engage students in authentic learning activities of knowledge construction.
- Third, cooperative work in the classroom, using as a tool based technology devices "one to one " where the teacher has a program of classroom

management, allows not only the enhancement of teamwork where each member takes responsibilities involving the group, but also a personalized and individualized instruction, adapting to the rhythms of the students, and allowing to achieve the targets set in which has been proposed for them individualized Work Plan.

**Challenges**

Though CSCL holds promise for enhancing education, it is not without barriers or challenges to successful implementation. Obviously, students or participants need sufficient access to computer technology. Though access to computers has improved in the last 15 to 20 years, teacher attitudes about technology and sufficient access to Internet-connected computers continue to be barriers to more widespread usage of CSCL pedagogy.

Furthermore, instructors find that the time needed to monitor student discourse and review, comment on, and grade student products can be more demanding than what is necessary for traditional face-to-face classrooms. The teacher or professor also has an instructional decision to make regarding the complexity of the problem presented. To warrant collaborative work, the problem must be of sufficient complexity, otherwise teamwork is unnecessary. Also, there is risk in assuming that students instinctively know how to work collaboratively. Though the task may be collaborative by nature, students may still need training on how to work in a truly cooperative process.

Others have noted a concern with the concept of scripting as it pertains to CSCL. There is an issue with possibly over-scripting the CSCL experience and in so doing, creating "fake collaboration". Such over-scripted collaboration may fail to trigger the social, cognitive, and emotional mechanisms that are necessary to true collaborative learning.

There is also the concern that the mere availability of the technology tools can create problems. Instructors may be tempted to apply technology to a learning activity that can very adequately be handled without the intervention or support of computers. In the process of students and teachers learning how to use the "user-friendly" technology, they never get to the act of collaboration. As a result, computers become an obstacle to collaboration rather than a supporter of it

**Conclusion**

Studies in the field of computer-assisted language learning (CALL) have shown that computers provide material and valuable feedback for language learners and that computers can be a positive tool for both individual and collaborative language learning. CALL programs offer the potential for interactions between the language learners and the computer. Additionally, students' autonomous language learning and self-assessment can be made widely available through the web. In CSCL, the computer is not only seen as a potential language tutor by providing assessment for students' responses, but also as a tool to give language learners the opportunity to learn from the computer and also via collaboration with other language learners. Juan focuses on new models and systems that perform efficient evaluation of student activity in online-based education. Their findings indicate that CSCL environments organized by teachers are useful for students to develop their language skills. Additionally, CSCL increases students' confidence and encourages them to maintain active learning, reducing the passive reliance on teachers' feedback. Using CSCL as a tool in the second language learning classroom has also shown to reduce learner anxiety.

Various case studies and projects had been conducted in order to measure the effectiveness and perception of CSCL in a language learning classroom. After a collaborative internet-based project, language learners indicated that their confidence in using the language had increased and that they felt more motivated to learn and use the target language. After analyzing student questionnaires, discussion board entries, final project reports, and student journals, Dooly suggests that during computer supported collaborative language learning, students have an increased awareness of different aspects of the target language and pay increased attention to their own language learning process. Since the participants of her project were language teacher trainees, she adds that they felt prepared and willing to incorporate online interaction in their own teaching in the future.

**References**


Asterhan, C., & Schwarz, B. (2010). Online moderation of synchronous e-argumentation. International Journal of Computer-Supported Collaborative Learning, 5(3), 259-82. doi:10.1007/s11412-010-9088-2

Bannon, Liam J. (1989). Issues in computer supported collaborative learning. Archived 2011-01-26 at the Wayback Machine. Chapter to appear in Proceedings of NATO Advanced Workshop on Computer-Supported Collaborative Learning (Claire O'Malley, Editor) held in Maratea, Italy, Sept. 1989.

Heimbuch, S., & Bodemer, D. (2015). Let's Talk about Talks: Supporting

Onrubia, J. & Engel, A. (2009). Strategies for Collaborative Writing and Phases of Knowledge Construction in CSCL Environments. Computers & Education, 53(4), 1256-1265.

Resta, P. & Laferrière, T. (2007).

Knowledge Exchange Processes on Wiki Discussion Pages. In *AAAI Technical Report on Wikipedia, a Social Pedia: Research Challenges and Opportunities (ICWSM-15)* (Vol. WS-15-19), 56–61. Palo Alto, USA: AAAI Press.

Hmelo-Silver, C.E. (2006). Analyzing collaborative learning: Multiple approaches to understanding processes and outcomes. Proceedings of the 7th international conference on Learning sciences, USA, 1059-1065. ISBN 0-8058-6174-2

International Society for the Learning Sciences. (2010). Conferences Archived 2011-05-25 at the Wayback Machine.. Retrieved 10/20/2010.

Johnson, D., Johnson, R., & Holubec, E. (2002). Circles of learning: Cooperation in the classroom. Edina, MN: Interaction Book Company, p. 95-118,

Kearsley, G. (13 Oct 10). The Theory Into Practice Database.

Koschmann, T. (1996) CSCL: Theory and practice of an emerging paradigm Mahwah, NJ: Lawrence Erlbaum.

Larusson, J., & Alterman, R. (2009). Wikis to support the "collaborative" part of collaborative learning. International Journal of Computer-Supported Collaborative Learning, 4(4), 371-402. doi:10.1007/s11412-009-9076-6

Nelson, B., & Ketelhut, D. (2008). Exploring embedded guidance and self-efficacy in educational multi-user virtual environments. International Journal of Computer-Supported Collaborative Learning, 3(4), 413-27. doi:10.1007/s11412-008-9049-1

Technology in Support of Collaborative Learning. *Educational Psychology Review*, 19, 65–83.

Scardamalia, M. & Bereiter, C. (1994). Computer support for knowledge building communities. The Journal of the Learning Sciences. 3(3), 265-283.

Stahl, G. (2002). Contributions to a theoretical framework for CSCL. In G. Stahl (Ed.), Computer support for collaborative learning: Foundations for a CSCL community. Proceedings of CSCL 2002 (pp. 62-71). Boulder, CO: Lawrence Erlbaum Associates.

Stahl, G. (2004). Building collaborative knowing: Elements of a social theory of CSCL. In J.-W. Strijbos, P. Kirschner & R. Martens (Eds.), What we know about CSCL: And implementing it in higher education (pp. 53-86). Boston, MA: Kluwer Academic Publishers.

Stahl, G. (2006). Group Cognition: Computer support for building collaborative knowledge. Cambridge:MA. MIT Press.

Stahl, G. (2009). Studying Virtual Math Teams. New York:NY. Springer.

Stahl, G. (2013). Translating Euclid: Creating a Human-Centered Mathematics. Morgan & Claypool Publishers.

Stahl, G. (2016). Constructing dynamic triangles together: The development of mathematical group cognition. Cambridge, UK: Cambridge University Press.